

pounds, gives $734.6 \times 15 = 11016$ lbs. or 5 tons very nearly.

By trigonometry, the angle $\angle Br$ is equal to $47^\circ 1'$, and consequently, $\angle Br$ is $42^\circ 59'$; but $\angle Br$ is equal to $\angle Rr$, because the triangle BAR is isosceles. And Ar is perpendicular to BR ; therefore Br is equal to half the whole weight acting in the direction of BR , or $2\frac{1}{2}$ tons; hence we have $Ar = 2\frac{1}{2} \times \cot. 42^\circ 59'$; but the natural cotangent of $42^\circ 59'$, is 1.0729, and $1.0729 \times 2\frac{1}{2} = 2.6823$ tons, for the effective thrust of the roof upon the wall in the direction of the horizon. This force, however, acts with the leverage $AF = 12$ feet, and this gives a momentum or mechanical effect of $2.6823 \times 12 = 32.1864$ tons.

Now the wall is 12 feet thick, 12 feet high, and 34 feet long; the solidity is, therefore, equal to $34 \times 12 \times 12 = 510$ cubic feet, and a cubic foot of brickwork is about 55 lbs.; but $510 \times 55 = 28050$ lbs., or 21.43 tons the whole weight of the wall, and this resists the thrust of the roof with a leverage of 71 inches, or 0.625 of a foot; the momentum of resistance is, therefore, equal to $21.43 \times 0.625 = 13.51875$ tons; but we have shown above, that the momentum of the roof is 32.1864 tons, consequently, the momentum of thrust exceeds the momentum of resistance by 18.668 tons nearly, thereby indicating that very substantial ties were necessary to give the building sufficient stability. But even ties placed where they are said to exist, would have a very powerful effect in diminishing the force of thrust over that of the resistance, and, consequently, the calculation made out on the supposition that there are no ties, places the subject in rather an unfavourable light, and quite at variance with the actual state of the case; but our object being more with a view of shewing the mode of calculation in inquiries of this nature, than to shew the efficiency or deficiency of the building in question, we consider the subject as being worthy of some attention. We are not sure that practical men will agree with us in the mode of examination that we have chosen; but we insist upon it, that a calculation should in every instance be resorted to; and to insure complete safety, such calculation should always have reference to the most unfavourable state of the question.

A similar process may be applied to the lower pitch represented by AHC ; but we prefer omitting it, as a repetition of the process may become tedious to the general reader, who may, or may not, perform the operations according as he feels inclined. T.

TUNNEL UNDER LONDON.

FOR THE LONDON AND BIRMINGHAM RAILWAY.

THE proposal made by the London and Birmingham Railway Company, under the direction of their engineer, Mr. Robert Stephenson, to reach their intended central station in Farringdon-street (the site of the late Fleet Prison) by means of a tunnel under London, has excited great attention.

The works of this undertaking, according to the *Railway Telegraph*, are proposed to commence at the Camden Town station of the Birmingham Railway, crossing the Hampstead-road by means of two arches of 70 feet span and 16 feet in height, the junction with the London and Birmingham requiring no alteration of level. From the Hampstead-road the line is proposed to pass (by means of a viaduct varying from 15 to 21 feet in height, and at an inclination of 1 in 97) over Grainger-street, Leybourne-road, to the Kentish-town road, and from thence over the Camden-road, Brecknock-place, Great College-street, and the Camden-road viaduct, at an inclination of 1 in 134, and at a height varying between 20 and 164 feet. After passing the King's-road the viaduct is to be succeeded by an embankment at an inclination of 1 in 60, and then by a cutting to the western side of Maiden-lane, and to the north of Roodall's tile-kilns. At this point the proposed tunnel commences, being at a distance of 1 mile 165 feet from the Camden station, at a depth of 37 and a width of 30 feet. The tunnel takes its course under Carlton-gardens and William-street, Caledonian-road, at a depth varying from 39 to 45 feet, and thence under the Caledonian-road at a depth of 54 feet. From this point the tunnel is proposed to proceed, at a gradually increasing depth, under the tunnel of the Regent's-

canal, near Half Moon-crescent, where the depth is 90 feet.

The direction of the tunnel is then under Penton-street, Chapel-street, and White Lion-street, Pentonville, the depth being no less than 101 feet, and the inclination being 1 in 1062. From hence the tunnel passes under the New-road, at Claremont-terrace, in the rear of St. Mark's Church, Myddelton-square, at a depth of 87 feet, gradually decreasing until the tunnel arrives at the New River Head, under which it is proposed to be carried at a depth of 68 feet. A gradual decrease in depth then takes place; under Myddelton-street, Clerkenwell, it is 51 feet; Gloucester street, 48 feet; Skinner-street, Clerkenwell, 43 feet; Corporation-row, Sekford-street, and Suffolk-street, each at a depth of 42 feet; Aylesbury-street (leading to the Sessions House), 41 feet; and St. John's-square, 38 feet. From this point the tunnel passes under the closely-populated districts of St. Sepulchre Without, at depths gradually decreasing until it reaches Cnivercross, where it will be only 25 feet below the surface. Here it is proposed to carry the tunnel, at a depth varying from 28 to 33 feet, from Greenhill's-roads to West Smithfield, at an inclination of 1 in 1062. Passing under Greyhound Inn-yard at a depth of 31 feet, the tunnel is proposed to reach Hosier-lane at 28 feet, Cock-lane at 29 feet, and the Baracca's Head Inn-yard at a similar depth. Under Skinner-street, Snow-hill, the depth will be 26 feet, and the tunnel will terminate at Angel-court, on the southern side of Skinner-street, at a depth of 24 feet. A small cutting will here commence, passing through Green Arbor-court, at a depth of 19 feet; Bishop's-court, 14 feet; Seacoal-lane, 11 feet; Fleet-lane, 6 feet; and thence into the city terminus, Fleet Prison yard, where the line will emerge on a level.

The entire length of the intended extension will be 3 miles $\frac{1}{4}$ chains, of which the tunnel will occupy two miles. It is a singular fact that the tunnel will pass under only one main sewer.

ACCIDENTS TO BUILDINGS.

LAST week, during a storm of wind, say the daily papers, part of the steeple of the church, lately erected at Red-hill, near Reigate, under the superintendence of Mr. Knowles, architect, fell with violence into the body of the church, penetrating the roof, ceiling, and timbers. "The seats are very much damaged, some of them shivered into splinters, and others actually torn from the flooring—such was the force of the concussion." Circumstantial as this account appears, the architect says it is wholly untrue. One stone from the upper part of a pinnacle was all that fell, and the damage was trifling. The same week in Bristol, at some new buildings which had been in progress of construction, to increase the accommodation for transfer of goods, a vast pile of scaffolding came with a loud crash to the ground. Five of the workmen were more or less injured, and one or two very dangerously so. In the vicinity of Ewer-street, Gravel-lane, Southwark, much alarm was caused by a stack of chimneys falling on the roof of a small cottage occupied by a family of poor Irish persons, one of whom was seriously injured by a large portion of brickwork, which fell upon the head of the eldest child, causing a fracture of the skull, and lacerating the scalp to a considerable extent. A portion of a house situated in White's-place, Newington-causeway, was blown down, but fortunately no one was injured.

DANGER OF IMPROPERLY FIXING STOVES.

THE residence of the Duke of Cambridge, was nearly burnt last week, in consequence of improperly setting a stove of low construction in the duke's bedroom. The grate was set on a hearth-stone, with fire bricks and Welsh lamps, but sufficient care had not been taken to secure the timber beneath. On the grate and hearth-stone being removed, it was found that the latter had been placed directly over a beam about a foot square, which, owing to the great heat occasioned by the fires kept to warm the room, had ignited, and set fire to the girders and other portions of the flooring.

ADVICE TO ARCHITECTS.

BIRKENHEAD.

I OBSERVE in your publication of Saturday, that a hospital is to be competed for at Birkenhead, and as your journal is to be found on the desk of almost every architect, I would beg most respectfully to recommend that the competitors submit that a competent tribunal be formed for deciding upon the best plan,—a tribunal composed of gentlemen of known integrity and taste.

I have had an excellent opportunity for these several years, of judging of the general character of the Birkenhead proprietors, four in six of whom entirely rule the commissioners of the township, are themselves in the commission of the peace, very extensive land speculators, and four of whom keep each an architect almost constantly engaged. Indeed five of them are building each a church, to form a sort of nucleus in their neighbourhood, and they are all well disposed towards any and every scheme that is likely to be the means of giving a "local habitation and a name" to their projects. Besides, it is not improbable that a *ci-devant* architect now elevated to a land-seller, may be on the committee, who (if the gentlemen alluded to do not support their respective protégés), may probably cause the whole of the designs to be thrown aside, and propose to make a more suitable plan than any of them, after the variety of information he will have acquired.

An able article, or report, of the Institute of the Fine Arts on public competitions appeared in a former number, which might be usefully read by every architect as well as every honest committee for a true mode of rewarding sterling merit.

But in the present case, competitors ought respectively to demand a published list of the judges of this matter, otherwise they may find the result unsatisfactory.

I remain, Sir, &c.

Liverpool.

VERITAS.

2. Knowing what we do of some of the leading men in Birkenhead,—men who have effected extraordinary things, and are remarkable for ability and energy,—we have no reason to expect that the competition will be worse managed than, unfortunately, these things usually are. We insert our correspondent's letter (which represents two or three received by us), to shew the committee that parties are looking on, and to induce them to set a good example in this respect as they have in some others. We shall ourselves feel bound to watch the proceedings, by the fact, that we have given the address for particulars, &c., to more than a score of applicants. We conjure each member of the committee to deal as he would if all the responsibility rested on himself.

EFFECTS OF RAILWAY ENTERPRISE.

THE mass of railway enterprise, domestic and foreign, is the strong and distinct evidence of a mighty stride in the progress of nations. One of those great eras which mark the world's history. It may be fraught with the ruin of hundreds, it professes to be big with the happiness of millions. It is looked upon as the precursor of great good, because it comprises, as essential ingredients to its accomplishment, whatever is calculated to elevate, improve, and extend the interests of all classes—the circulation of money—the extension of commerce—the employment of the people—the improvement of the facilities of intercourse at home and abroad. It is impossible to say what important results may spring from these facilities—what discoveries may be effected in science—what increased resources may be acquired at home—what new relations may be formed abroad. With countries into which we have scarcely yet penetrated it may be our privilege to enter into the most advantageous alliances; to open out an intercourse that may provide food and employment for millions unborn. It may be ours to bring into the closest intimacy of family relation the inhabitants of new and comparatively unknown regions, to form settlements, raise cities, and extend all the advantages of trade, and the blessings of religion, where the sound of the hammer has not yet rung, the rush of steam never yet been heard, nor the tidings of salvation yet been proclaimed. Holding such sentiments as these, we should